Lab | Reading About Statistic Concepts

Challenge 1: What is the difference between expected value and mean?

If we look at the mean it´s the sum of values divided by the amount of values ór it is 1 times the frequency of a values that occurs.

Values: 1, 2, 2, 3, 4, 5, 5, 5
Method 1:
27/8 = 3,375

Method 2:
(1*1/8) + (2*3/8) + (3*1/8) + (4*1/8) + (5*3/8) = 3,375

So the mean is calculated over multiple occurrences.

The expected value, is 'the value you expect' when doing an experiment once. In other words, what value has highest probability to occur? It will be true for a big amount of experiments (so it can be called a long-run average or a weighted average). Numerically then are the same, but it is a prediction for a specific future event (so one specific event). You are trying to predict the future.

Formula:
P(x) * n

Challenge 2: What is the "problem" in science with p-values?

The biggest problem is the philosophical discussion about the fact that it is, like everything we know and we believe, that it is made up by humans. Not only the p-value is made up by humans, but also the whole field of statistics and math is made up by people. While we can 'prove' things with numbers we tend to believe them and statistics and the p-value is believed to be true and is where all of the research ends, it's where we reject of not reject an hypothesis. But by NOT rejecting it, we are not saying it is true, we say there is a significant difference but we are never completely sure why and what it says. Only the fact that we use the term not rejecting to be safe and have less discussion is a problem by itself, or would the problem be that we fact that nothing is sure in life but we are always looking for confirmation and a way to predict the future?

Future problems with looking at statistics and research is the fact that we almost exclusively are able to take samples, and we can never look at the whole population. What if, this sample is an exception, but the last sample was also out of the confidence interval, just like the one before? This chance is small, but it is possible. Which research should we believe? Who is right? What factors influence the sampling method? And do we know? Or aren't we aware of these influencing factors while we have a big blind spot for it and we can't see it while we don't know about it?

A way to be a bit more sure about our work would be to use multiple statistical tests, and have a fixed way of working with your data. To best thing would be to validate this way of working with multiple people of different field and preferably also all around the world. The best way of working

with data would be to trust your instinct and think about what, why and how you are doing things instead of just following guidelines. Both when you get an expect AND when you get an unexpected result.

Challenge 3: Applying testing to a specific case: A/B testing.

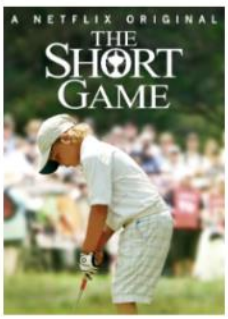
The customized cover of Netflix movies/series showed to give a big improvement in click trough rate. So let's have a look at it.

Creating hypothesis:

H0: There is no difference in click-through rate between the control cells and cell 2 and cell 3
H1: There is a difference in click-through rate between the control cell and cell 2 and cell 3

I would doubt between a chi-square test and a t-test while I'm comparing the means of two populations and there is a clear 'Yes' and 'No' . While it is Netflix I assume that there is a large data set and I would choose the t-test. However, I would divide see if there is enough data to divide my groups according to psycho variables instead of variables as country where they watch, age, gender and from those samples I would do another analyses. If the sample size is to small I would use a chi-square test to see if there is a relation. If that's worth investigating I would have a look at an two-way ANOVA to compare multiple groups of subscribers with two different variables.

So the y-axis would be 'click through rate'.
Variable 1 would be watches more then 2 hours a week.
Variable 2 would be watches from an account where more then one screen at a time can play.

Cells	Cell 1 (Control)	Cell 2	Cell 3
Box Art	 Default artwork	 14% better take rate	 6% better take rate